



TEST DATA OF MGS10053R3

Regulated DC Power Supply
August 5, 2016

Approved by :

Takayuki Fukuda
Takayuki Fukuda

Design Manager

Prepared by :

Ryosuke Nakao
Ryosuke Nakao

Design Engineer

COSEL CO.,LTD.



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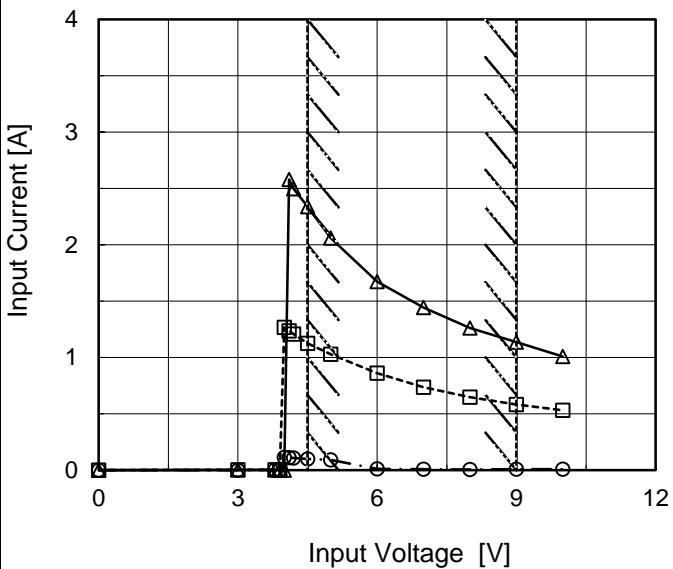
(Final Page 19)

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Model	MGS10053R3
Item	Input Current (by Input Voltage)
Object	_____

1.Graph

—△— Load 100%
 - -□--- Load 50%
 - -○--- Load 0%



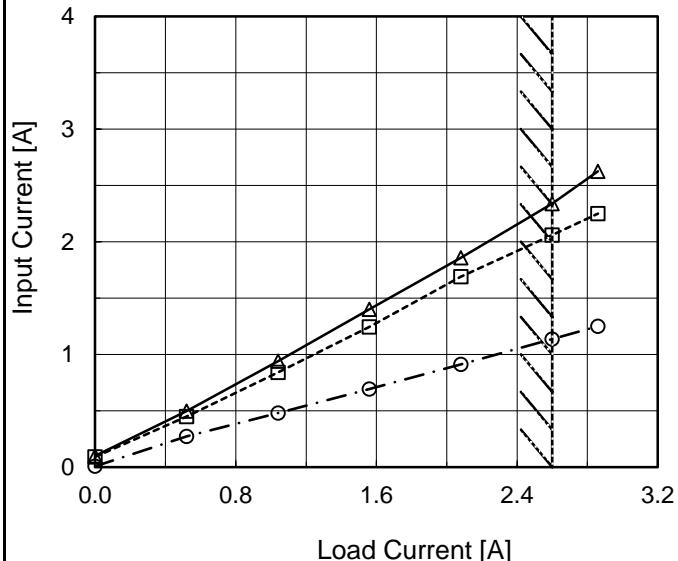
Note: Slanted line shows the range of the rated input voltage.

 Temperature 25°C
 Testing Circuitry Figure A

2.Values

Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0.0	0.000	0.000	0.000
3.0	0.000	0.001	0.002
3.8	0.001	0.003	0.003
3.9	0.002	0.003	0.001
4.0	0.112	1.266	0.001
4.1	0.111	1.237	2.581
4.2	0.108	1.208	2.497
4.5	0.099	1.124	2.338
5.0	0.091	1.029	2.059
6.0	0.011	0.860	1.675
7.0	0.007	0.735	1.442
8.0	0.006	0.647	1.262
9.0	0.007	0.582	1.135
10.0	0.008	0.530	1.009
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Model	MGS10053R3	Temperature	25°C																																																			
Item	Input Current (by Load Current)	Testing Circuitry	Figure A																																																			
Object																																																						
1.Graph	—△— Input Volt. 4.5V - - -□--- Input Volt. 5V - - ○--- Input Volt. 9V																																																					
	 <p>The graph shows the relationship between Input Current [A] on the Y-axis (0 to 4) and Load Current [A] on the X-axis (0.0 to 3.2). Three curves are plotted for different input voltages: 4.5V (solid line with triangles), 5V (dashed line with squares), and 9V (dash-dot line with circles). A vertical dashed line is drawn at approximately 2.5A, and a slanted dashed line connects points on the 4.5V and 5V curves at approximately 2.5A, defining a region for the rated load current.</p>																																																					
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Input Volt. 4.5[V]</th> <th>Input Volt. 5[V]</th> <th>Input Volt. 9[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>0.099</td><td>0.091</td><td>0.007</td></tr> <tr><td>0.52</td><td>0.496</td><td>0.448</td><td>0.272</td></tr> <tr><td>1.04</td><td>0.939</td><td>0.840</td><td>0.481</td></tr> <tr><td>1.56</td><td>1.401</td><td>1.245</td><td>0.693</td></tr> <tr><td>2.08</td><td>1.858</td><td>1.690</td><td>0.912</td></tr> <tr><td>2.60</td><td>2.338</td><td>2.059</td><td>1.135</td></tr> <tr><td>2.86</td><td>2.625</td><td>2.250</td><td>1.250</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Input Current [A]			Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]	0.00	0.099	0.091	0.007	0.52	0.496	0.448	0.272	1.04	0.939	0.840	0.481	1.56	1.401	1.245	0.693	2.08	1.858	1.690	0.912	2.60	2.338	2.059	1.135	2.86	2.625	2.250	1.250	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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<p>The graph plots Input Power [W] on the Y-axis (0 to 16) against Load Current [A] on the X-axis (0.0 to 3.2). Three curves are shown for different input voltages: 4.5V (solid line with open triangle markers), 5V (dashed line with open square markers), and 9V (dash-dot line with open circle markers). All curves show a linear increase in power with load current. A vertical dashed line is drawn at approximately 2.4A, and a slanted line connects the points (0,0) and (2.4, 11.44), indicating the rated load current range.</p>			<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Power [W]</th> </tr> <tr> <th>Input Volt. 4.5[V]</th> <th>Input Volt. 5[V]</th> <th>Input Volt. 9[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>0.44</td><td>0.46</td><td>0.05</td></tr> <tr><td>0.52</td><td>2.22</td><td>2.23</td><td>2.45</td></tr> <tr><td>1.04</td><td>4.11</td><td>4.12</td><td>4.32</td></tr> <tr><td>1.56</td><td>6.09</td><td>6.07</td><td>6.20</td></tr> <tr><td>2.08</td><td>8.14</td><td>8.11</td><td>8.11</td></tr> <tr><td>2.60</td><td>10.29</td><td>10.21</td><td>10.10</td></tr> <tr><td>2.86</td><td>11.44</td><td>11.32</td><td>11.11</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Current [A]	Input Power [W]			Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]	0.00	0.44	0.46	0.05	0.52	2.22	2.23	2.45	1.04	4.11	4.12	4.32	1.56	6.09	6.07	6.20	2.08	8.14	8.11	8.11	2.60	10.29	10.21	10.10	2.86	11.44	11.32	11.11	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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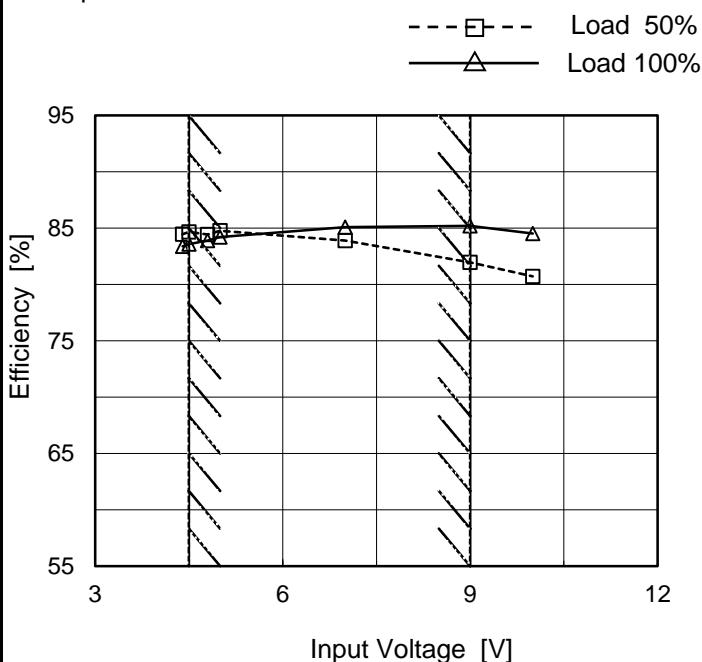
Note: Slanted line shows the range of the rated load current.

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Model	MGS10053R3
Item	Efficiency (by Input Voltage)
Object	_____

Temperature 25°C
 Testing Circuitry Figure A

1.Graph



2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
4.4	84.5	83.4
4.5	84.7	83.6
4.8	84.4	83.9
5.0	84.8	84.2
7.0	83.9	85.1
9.0	82.0	85.2
10.0	80.7	84.5
--	-	-
--	-	-

Note: Slanted line shows the range of the rated input voltage.

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Item	Efficiency (by Load Current)	Testing Circuitry	Figure A																																																			
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1.Graph	<p>The graph plots Efficiency [%] on the y-axis (55 to 95) against Load Current [A] on the x-axis (0.0 to 3.2). Three data series are shown for different input voltages: 4.5V (solid line with open triangle markers), 5V (dashed line with open square markers), and 9V (dash-dot line with open circle markers). All curves show efficiency increasing with load current. A slanted line on the graph indicates the range of the rated load current.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 4.5V [%]</th> <th>Input Volt. 5V [%]</th> <th>Input Volt. 9V [%]</th> </tr> </thead> <tbody> <tr><td>0.52</td><td>77.6</td><td>77.2</td><td>70.2</td></tr> <tr><td>1.04</td><td>83.7</td><td>83.6</td><td>79.7</td></tr> <tr><td>1.56</td><td>84.7</td><td>85.0</td><td>83.3</td></tr> <tr><td>2.08</td><td>84.6</td><td>84.8</td><td>84.9</td></tr> <tr><td>2.60</td><td>83.6</td><td>84.2</td><td>85.2</td></tr> <tr><td>2.86</td><td>82.6</td><td>83.5</td><td>85.1</td></tr> </tbody> </table>			Load Current [A]	Input Volt. 4.5V [%]	Input Volt. 5V [%]	Input Volt. 9V [%]	0.52	77.6	77.2	70.2	1.04	83.7	83.6	79.7	1.56	84.7	85.0	83.3	2.08	84.6	84.8	84.9	2.60	83.6	84.2	85.2	2.86	82.6	83.5	85.1																							
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Item	Line Regulation	Temperature 25°C Testing Circuitry Figure A																																
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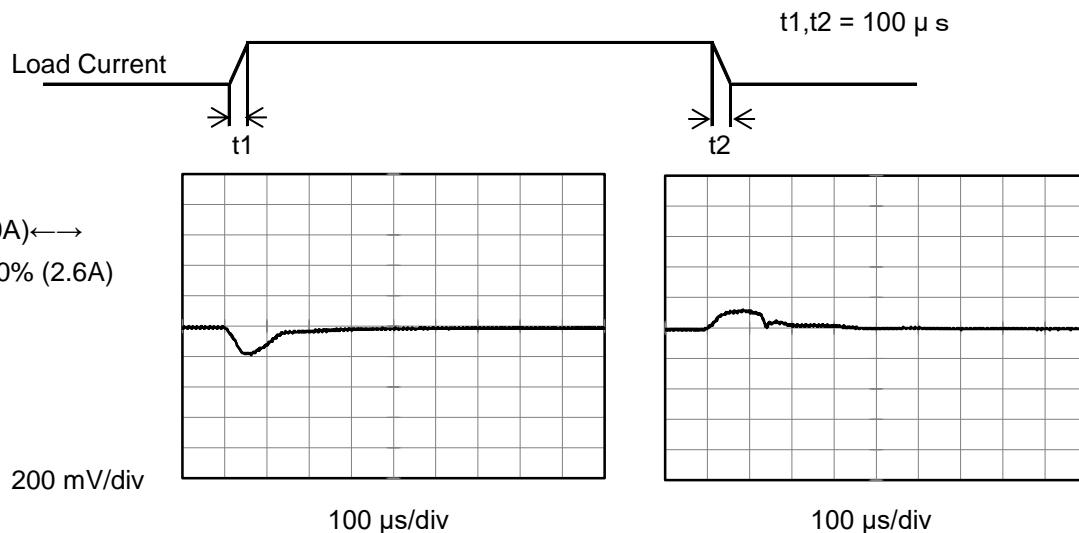
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<p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 4.5V Input Volt. 5V Input Volt. 9V 		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 4.5[V]</th> <th>Input Volt. 5[V]</th> <th>Input Volt. 9[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>3.309</td><td>3.309</td><td>3.310</td></tr> <tr><td>0.52</td><td>3.308</td><td>3.308</td><td>3.308</td></tr> <tr><td>1.04</td><td>3.306</td><td>3.307</td><td>3.307</td></tr> <tr><td>1.56</td><td>3.305</td><td>3.305</td><td>3.305</td></tr> <tr><td>2.08</td><td>3.304</td><td>3.304</td><td>3.304</td></tr> <tr><td>2.60</td><td>3.303</td><td>3.303</td><td>3.303</td></tr> <tr><td>2.86</td><td>3.302</td><td>3.302</td><td>3.302</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Output Voltage [V]			Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]	0.00	3.309	3.309	3.310	0.52	3.308	3.308	3.308	1.04	3.306	3.307	3.307	1.56	3.305	3.305	3.305	2.08	3.304	3.304	3.304	2.60	3.303	3.303	3.303	2.86	3.302	3.302	3.302	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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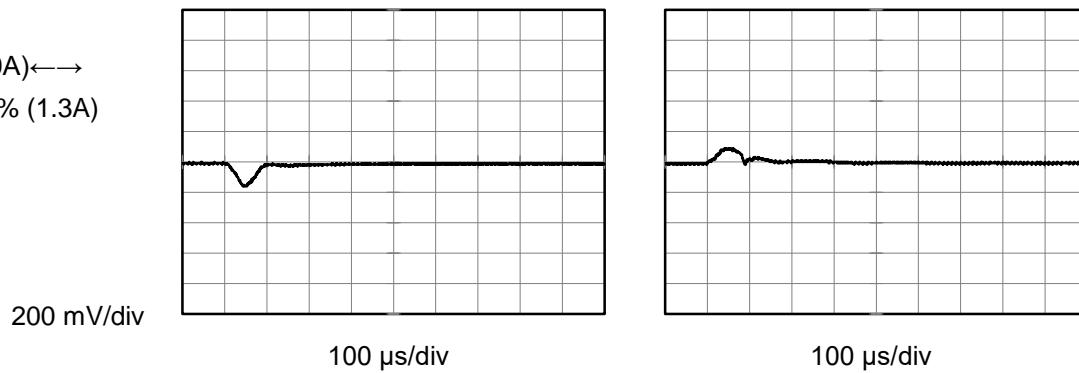
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Model	MGS10053R3	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+3.3V2.6A		

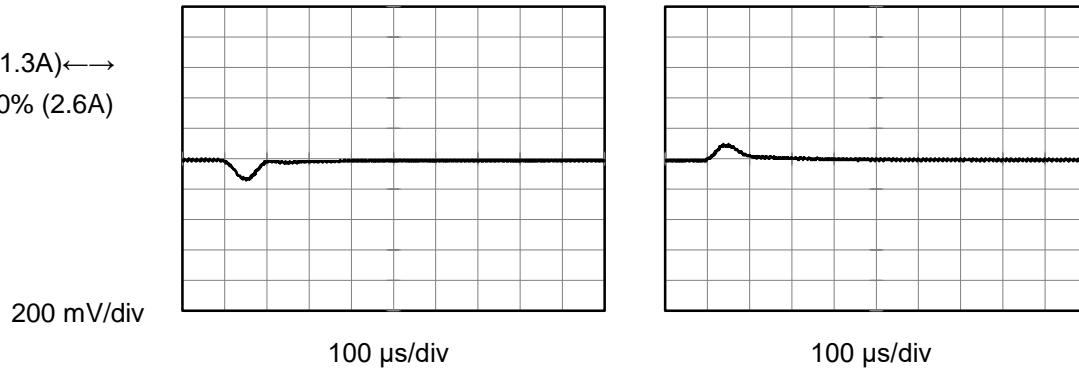
Input Volt. 5 V
 Cycle 100 ms



Min.Load (0A)↔
 Load 100% (2.6A)



Load 50% (1.3A)↔
 Load 100% (2.6A)



COSEL

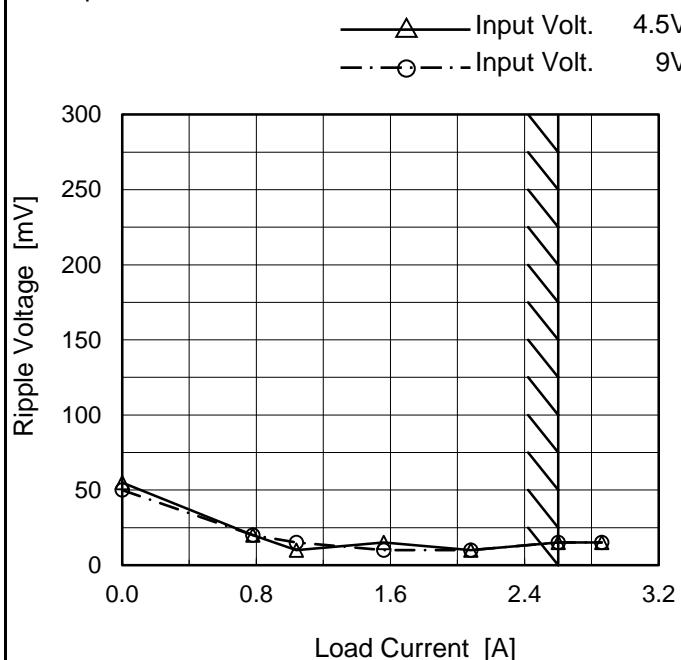
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Measured by 100 MHz Oscilloscope. Ripple Voltage is shown as p-p in the figure below. Note: Slanted line shows the range of the rated load current.																																								
<p>Ripple [mVp-p]</p> <p>Fig.Complex Ripple Wave Form</p>																																								
2.Values																																								
<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 4.5 [V]</th> <th>Input Volt. 9 [V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td> <td>55</td> <td>45</td> </tr> <tr> <td>0.78</td> <td>10</td> <td>15</td> </tr> <tr> <td>1.04</td> <td>5</td> <td>15</td> </tr> <tr> <td>1.56</td> <td>15</td> <td>5</td> </tr> <tr> <td>2.08</td> <td>10</td> <td>5</td> </tr> <tr> <td>2.60</td> <td>15</td> <td>15</td> </tr> <tr> <td>2.86</td> <td>15</td> <td>15</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>			Load Current [A]	Ripple Voltage [mV]		Input Volt. 4.5 [V]	Input Volt. 9 [V]	0.00	55	45	0.78	10	15	1.04	5	15	1.56	15	5	2.08	10	5	2.60	15	15	2.86	15	15	--	-	-	--	-	-	--	-	-	--	-	-
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COSEL

Model	MGS10053R3
Item	Ripple-Noise
Object	+3.3V2.6A

Temperature 25°C
Testing Circuitry Figure B

1. Graph



2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.00	55	50
0.78	20	20
1.04	10	15
1.56	15	10
2.08	10	10
2.60	15	15
2.86	15	15
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 100 MHz Oscilloscope.

Ripple-Noise is shown as p-p in the figure below.

Note: Slanted line shows the range of the rated load current.

Ripple Noise[mVp-p]

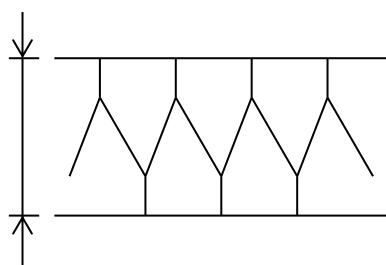


Fig.Complex Ripple Noise Wave Form

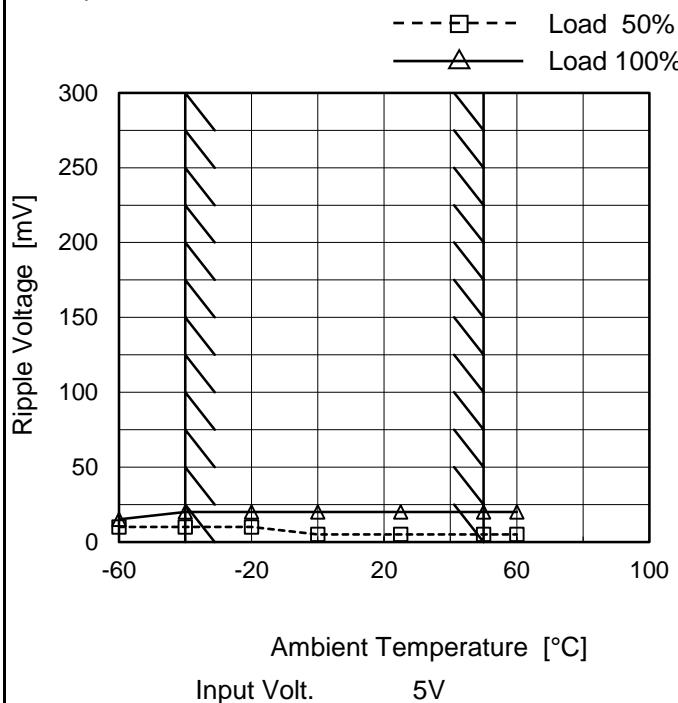
COSEL

Model MGS10053R3

Item Ripple Voltage (by Ambient Temp.)

Object +3.3V2.6A

1.Graph



Measured by 100 MHz Oscilloscope.

Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure B

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	10	15
-40	10	20
-20	10	20
0	5	20
25	5	20
50	5	20
60	5	20
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

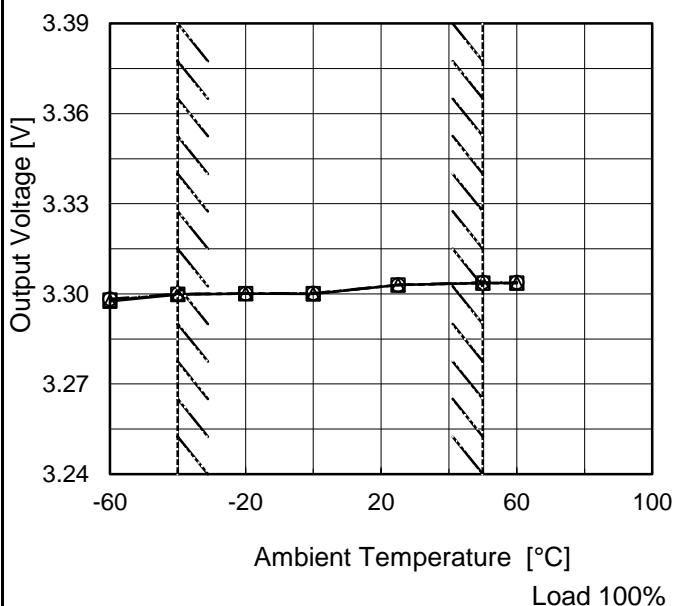
Model MGS10053R3

Item Ambient Temperature Drift

Object +3.3V2.6A

1.Graph

—△— Input Volt. 4.5V
 - - -□--- Input Volt. 5V
 - - -○--- Input Volt. 9V



Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
-60	3.298	3.298	3.298
-40	3.300	3.300	3.300
-20	3.300	3.300	3.300
0	3.300	3.300	3.300
25	3.303	3.303	3.303
50	3.304	3.304	3.304
60	3.304	3.304	3.304
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-



Model	MGS10053R3	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+3.3V2.6A	

1. Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -40 - 50°C

Input Voltage : 4.5 - 9V

Load Current : 0 - 2.6A

* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

$$\text{* Output Voltage Accuracy (Ratio)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	9	0	3.311	± 6	± 0.2
Minimum Voltage	-40	5	2.6	3.300		

COSEL

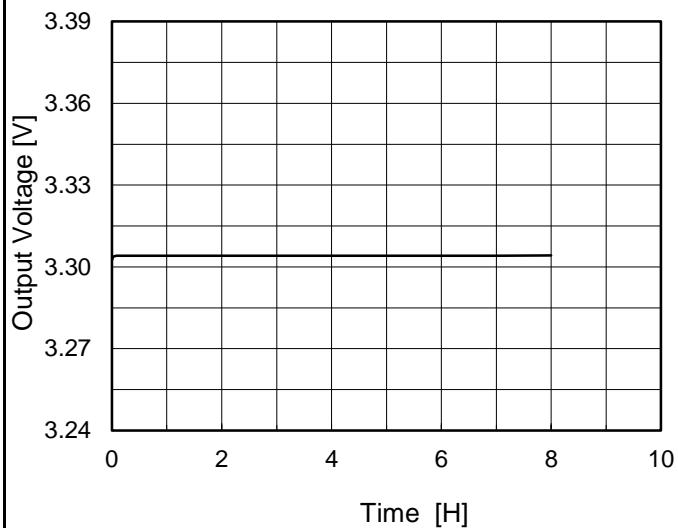
Model MGS10053R3

Item Time Lapse Drift

Object +3.3V2.6A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Input Volt. 5V
Load 100%

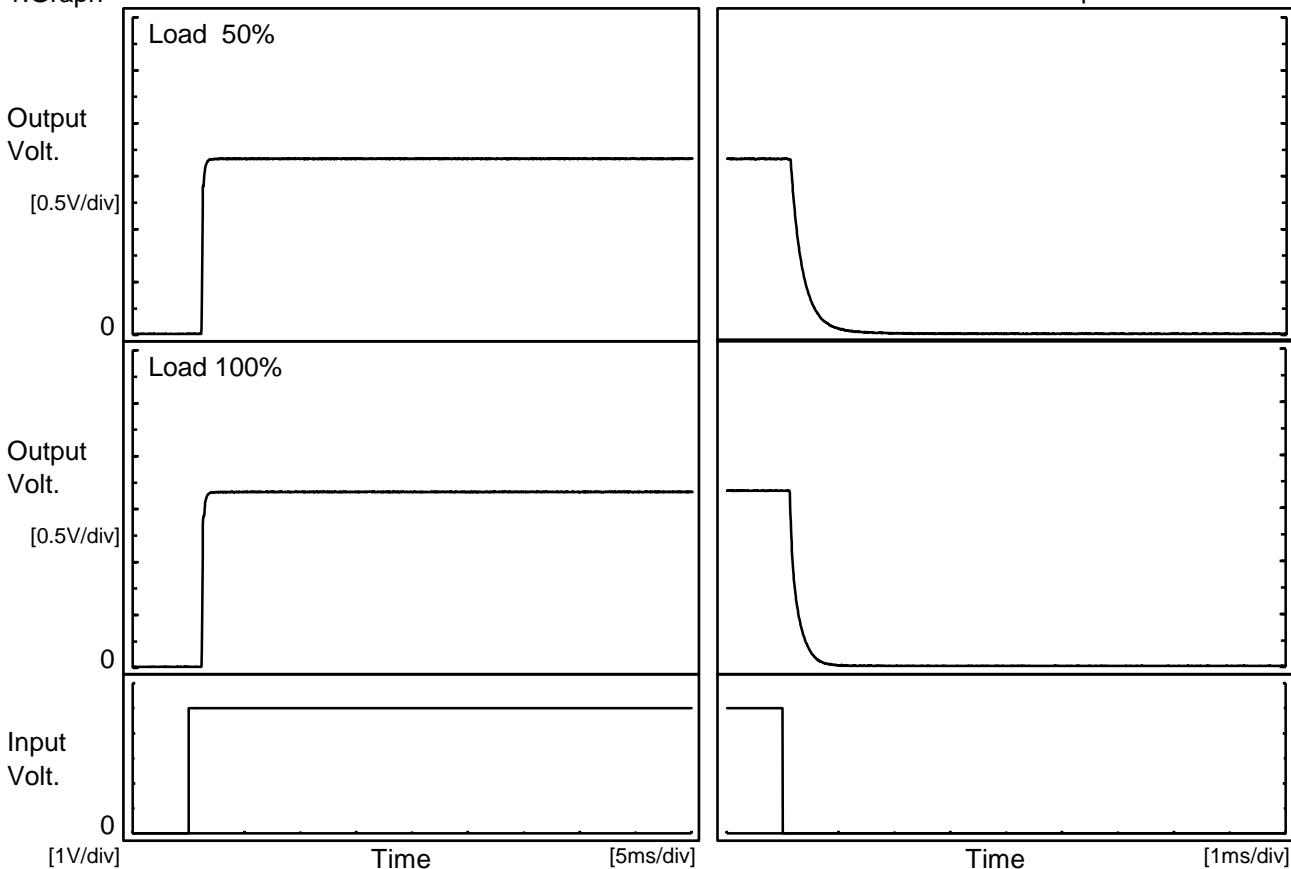
2.Values

Time since start [H]	Output Voltage [V]
0.0	3.302
0.5	3.304
1.0	3.304
2.0	3.304
3.0	3.304
4.0	3.304
5.0	3.304
6.0	3.304
7.0	3.304
8.0	3.304

COSEL

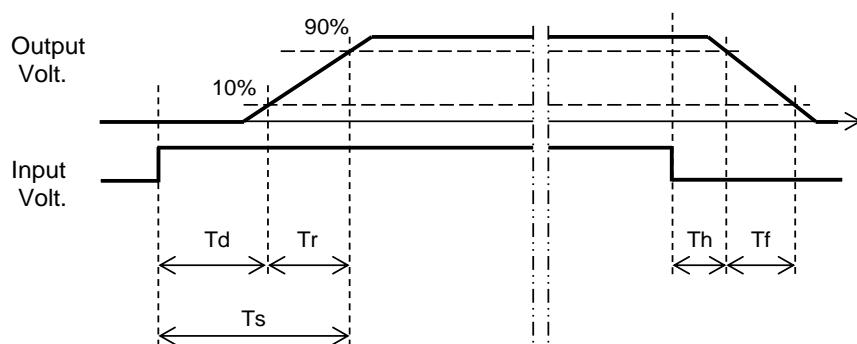
Model	MGS1005R3	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+3.3V2.6A		

1. Graph



2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		1.2	0.2	1.4	0.2	0.5	
100 %		1.2	0.2	1.4	0.1	0.3	



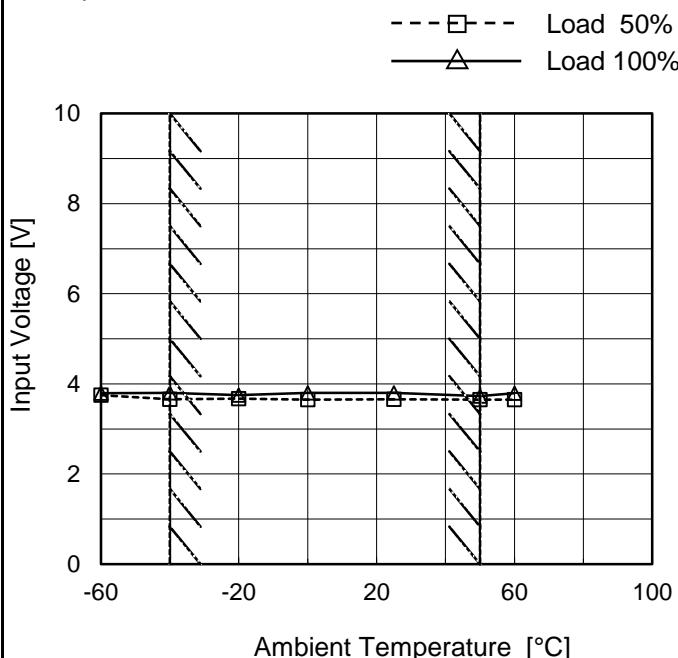
COSEL

Model MGS10053R3

Item Minimum Input Voltage
for Regulated Output Voltage

Object +3.3V2.6A

1. Graph



Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure A

2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.8	3.8
-40	3.7	3.8
-20	3.7	3.8
0	3.7	3.8
25	3.7	3.8
50	3.7	3.8
60	3.7	3.8
--	-	-
--	-	-
--	-	-
--	-	-

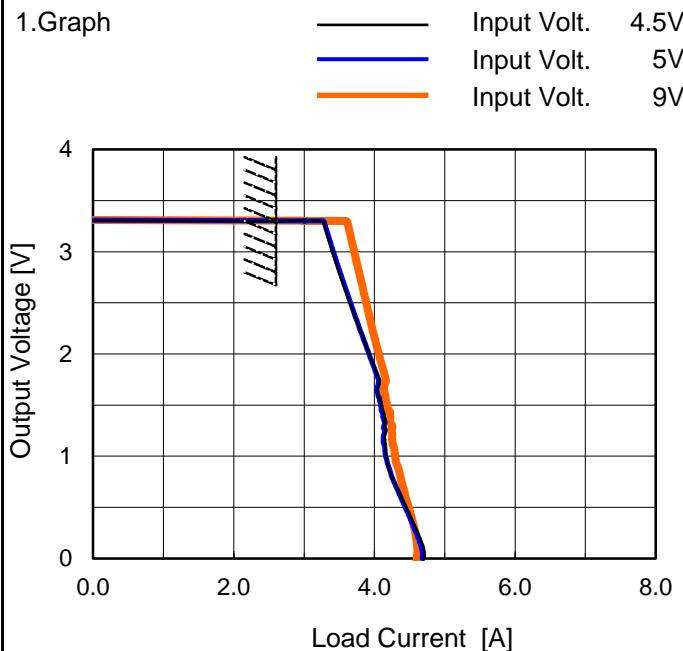
COSEL

Model MGS10053R3

Item Overcurrent Protection

Object +3.3V2.6A

1.Graph



Note: Slanted line shows the range of the rated load current.

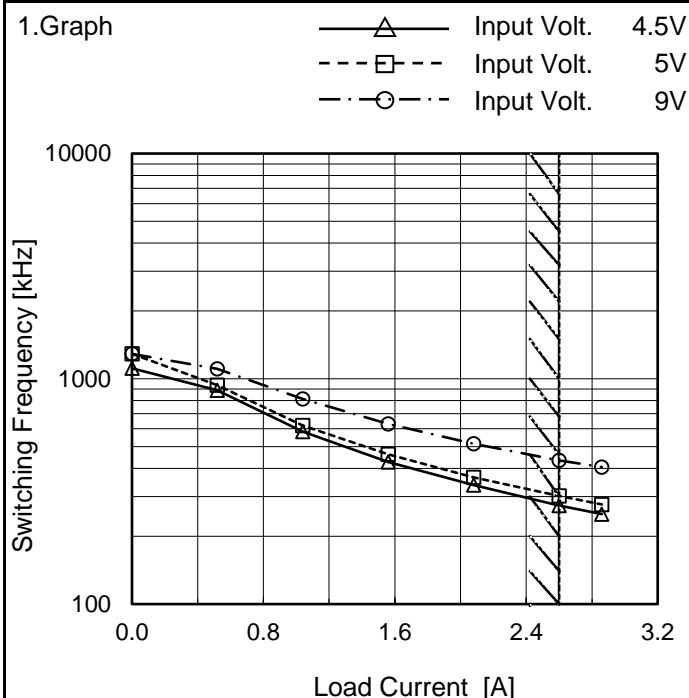
 Temperature 25°C
 Testing Circuitry Figure A

2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
3.30	2.64	2.64	2.64
3.14	3.34	3.36	3.67
2.97	3.41	3.43	3.72
2.64	3.57	3.59	3.83
2.31	3.74	3.76	3.95
1.98	3.93	3.93	4.06
1.65	4.05	4.05	4.13
1.32	4.16	4.15	4.23
0.99	4.17	4.16	4.29
0.66	4.33	4.33	4.42
0.33	4.56	4.54	4.56
0.00	4.71	4.68	4.60

COSEL

Model	MGS10053R3
Item	Switching Frequency (by Load Current)
Object	+3.3V2.6A


 Temperature 25°C
 Testing Circuitry Figure A

2.Values

Load Current [A]	Frequency [kHz]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.00	1114	1291	1290
0.52	890	937	1106
1.04	582	621	814
1.56	428	462	630
2.08	338	366	515
2.60	274	302	435
2.86	251	277	406
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Note: Slanted line shows the range of the rated load current.

When load current is low, MG operates intermittently, so switching frequency would not become constant.

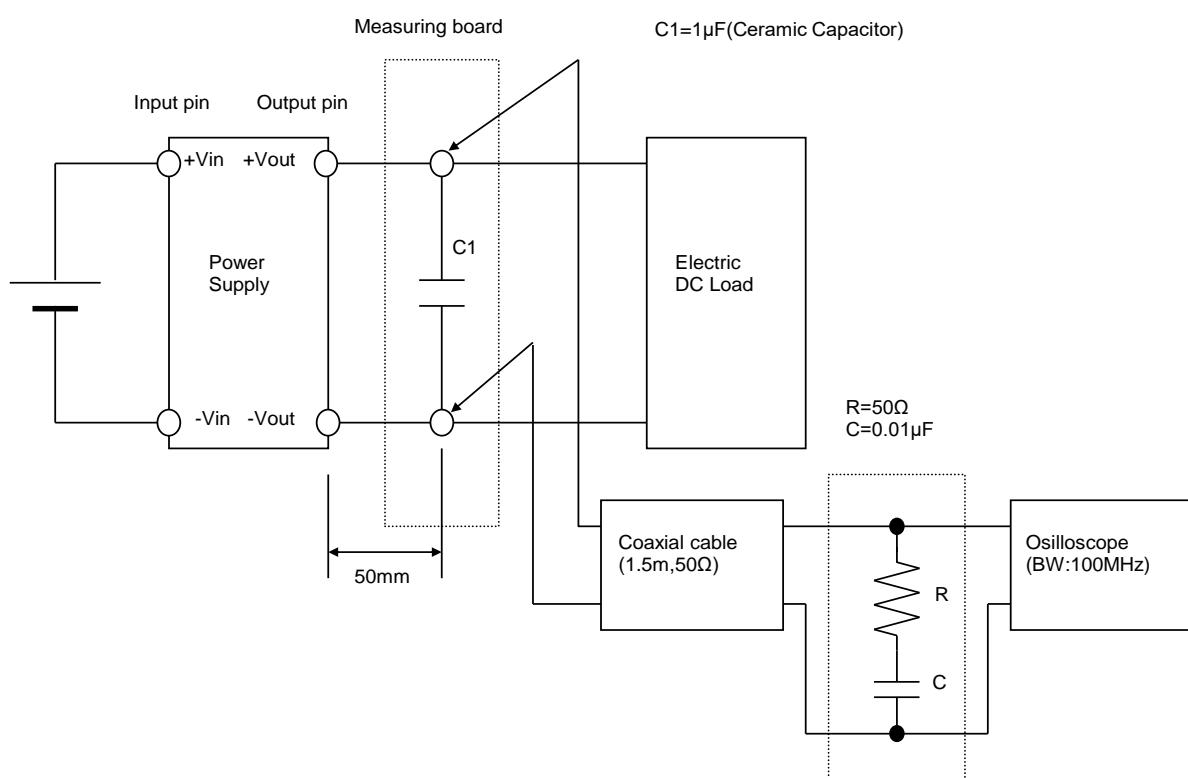
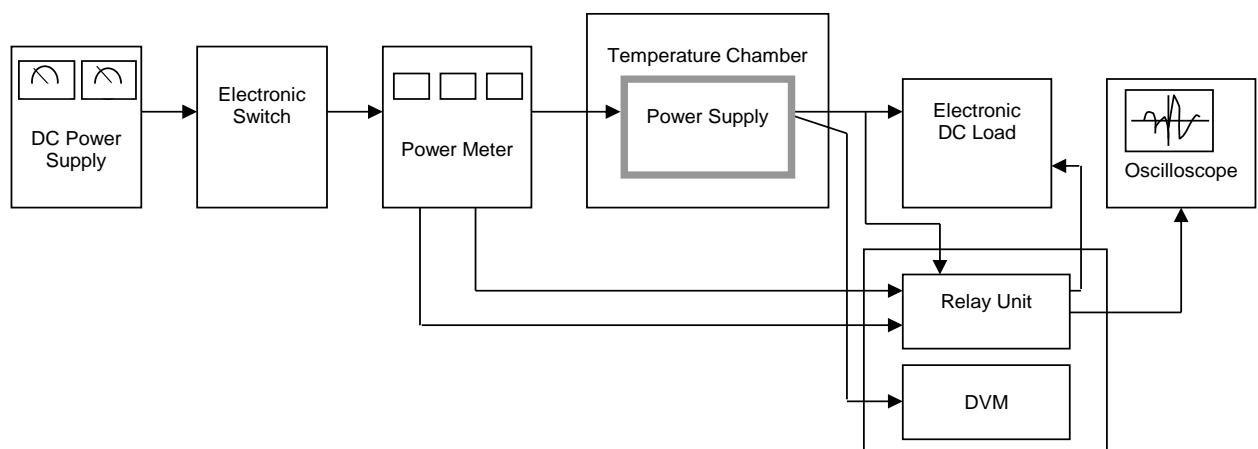


Figure B (Ripple and Ripple noise Characteristic)